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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/670,434	09/23/2003	Pinghai Hao	TI-35470	2415

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EXAMINER	
NGUYEN, KHIEM D	
ART UNIT	**PAPER NUMBER**
2823	

DATE MAILED: 12/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/670,434	HAO ET AL.	
	Examiner	Art Unit	
	Khiem D. Nguyen	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) *23-27* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1- 22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 29th, 2005 has been entered. A new rejection is made as set forth in this Office Action. Claims (1-22) are pending in the application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1- 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (U.S. Patent 6,391,733).

In re claim 1, **Fisher** discloses a method for fabricating a transistor structure, comprising the steps of:

providing a substrate **12** and forming a lightly doped drain (LDD) region **46, 48** in the substrate **12** (FIG. 4);

implanting a first dopant **100** has a lower dopant concentration (10^{12}-10^{15} atoms/cm^2) than that of the associated **120** LDD region **46,48** (1x 10^{12}- 1x10^{16}

atoms/cm^2) into the lightly doped drain (LDD) region **46, 48** to a depth less than a LDD junction depth (col. 4, line 45 to col. 5, line 34 and FIGS. 4 and 7); and

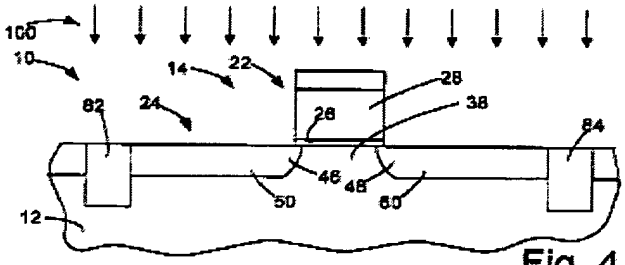


Fig. 4

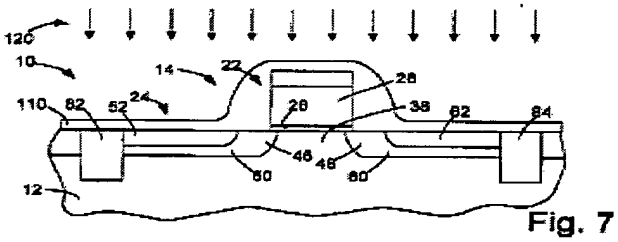


Fig. 7

implanting a second dopant **130** into the substrate **12** beyond the LDD junction depth to form a source/drain region **54,64,** the implantation of the second dopant overpowering ($5x10^{14}$-$1x10^{16}$) atoms/cm^2 a substantial portion of the first dopant to define a floating region **52, 62** of the first dopant within the LDD region 46, 48 (col. 5, lines 43-54 and FIG. 9).

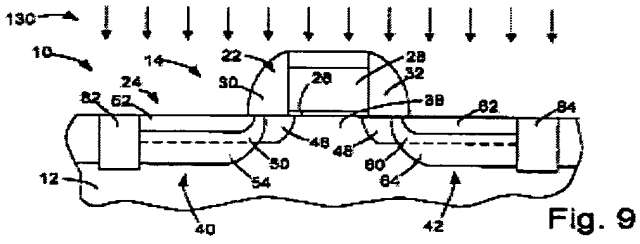


Fig. 9

Fisher discloses that the second dopant implant 120 and 130 is in the range 5 x 10^{12} to 1 x10^{16} atoms/cm^2 (col. 5, lines 19-62) and the dopant concentration of the LDD region is between 1x 10^{12} to $1x10^{16}$ atoms/cm^2 (col. 4, lines 45-53). **Fisher** further stated

that it will be appreciated that the energy and concentration of the implants may vary greatly depending on the type of material implanted and that other suitable values may be used instead. It will also be appreciated that different ranges may be used for different transistors on different parts of the same device. **Fisher** does not explicitly discloses that the floating structure having reduced dopant concentration relative to the dopant concentration of the LDD region as recited in the currently amended independent claim 1.

However, there is no evidence indicating that the dopant concentration ranges of the floating structure having reduced dopant concentration relative to the dopant concentration of the LDD region is critical and it has been held that it is not inventive to discover the optimum or workable dopant concentration ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP § 2144.05.

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

In re claim 2, **Fisher** discloses that the floating region further comprising a floating ring **52, 62,** substantially self-aligned with an edge of a gate **28** of the transistor structure **14** (col. 5, lines 19-34 and FIG. 9).

In re claim 3, **Fisher** discloses that the method of claim 1, further comprising forming the LDD region **46, 48** by implanting a dose 120 ($1x10^{12}$-$1x10^{16}$ atoms/cm^2) of

an LDD dopant that is greater than a dose of the first dopant 100 (10^{12}- 10^{15} atoms/cm^2) (col. 4, line 45 to col. 5, line 34 and FIGS. 4 and 7).

In re claim 4, **Fisher** discloses that the dose of the first dopant **100** being about twenty-percent or less of the dose of the LDD dopant **120** (col. 4, line 45 to col. 5, line 34 and FIGS. 4 and 7).

In re claim 5, it is well-known to one of ordinary skill in the art at the time of the invention was made that the at least one of the implantation of the first dopant and the implantation of the LDD dopant employing tilted angle implants to enhance an amount of overlap between a gate structure of the transistor structure and the LDD region.

In re claim 6, **Fisher** discloses that the dose of the second dopant **130** ($5x10^{14}$-$1x10^{16}$ atoms/cm^2) being greater than the dose of the LDD dopant **120** ($1x10^{12}$-$1x10^{16}$ atoms/cm^2) (col. 5, lines 19-54 and FIGS. 7 and 9).

In re claim 7, **Fisher** discloses that the implantation of the LDD dopant further comprising implanting a dose of n-type dopant in the range from about ($1x10^{12}$-$1x10^{16}$ atoms/cm^2), and the implantation of the first dopant **100** further comprising implanting a dose in a range from about (10^{12}-10^{15} atoms/cm^2) of a p-type dopant (col. 4, line 45 to col. 5, line 34).

In re claim 8, **Fisher** discloses that the transistor structure is a complimentary metal oxide semiconductor (CMOS) structure that includes a gate **28** having a side edge portion, the floating region **52, 62** being substantially aligned with the side edge portion of the gate **28** (FIG. 9).

In re claim 9, **Fisher** discloses that the CMOS structure is an n-channel CMOS structure, the first dopant **100** forming a shallow region in the LDD region that comprises a p-type dopant (FIG. 4).

In re claim 10, **Fisher** discloses that the first dopant **100** comprises boron (B), and the floating region **52, 62** further comprises a boron floating ring, substantially aligned with side edge portion of the gate **28** (col. 4, lines 45-53 and FIGS. 4 and 9).

In re claim 11, **Fisher** discloses that the CMOS structure is a p-channel CMOS structure, the first dopant **100** defining a shallow region that comprises an n-type dopant (FIGS. 4 and 9).

In re claim 12, **Fisher** discloses that the method of claim 1, further comprising: forming a gate structure **28** above the substrate **12**, the LDD region **46, 48** and the source/drain region **54, 64** being formed in the substrate **12** generally around the gate structure **28** the gate structure overlapping at least a substantial portion of the LDD region **46, 48** and the floating ring **52, 62** being substantially aligned with an edge of the gate structure 28 (FIG. 9).

In re claim 13, **Fisher** discloses a method for fabricating a CMOS transistor device, comprising the steps of forming a gate structure **28** on a substrate **12**, the gate structure **28** having a side edge;

forming a lightly doped drain (LDD) region **46, 48** in the substrate **12** laterally of a channel region **38** and extending beneath the gate structure (FIG. 4);

then forming a shallow region (10^{12}-10^{15} atoms/cm^2) in the LDD region **46, 48** having a lower concentration than that of the associated LDD region ($1x10^{12}$-$1x10^{16}$

atoms/cm^2) that extends into the substrate **12** to a depth that is less than an LDD junction depth and spaced from the channel region (col. 4, line 45 to col. 5, line 34 and FIGS. 4 and 7); and

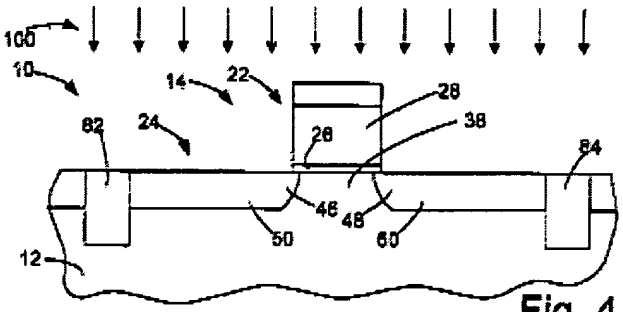


Fig. 4

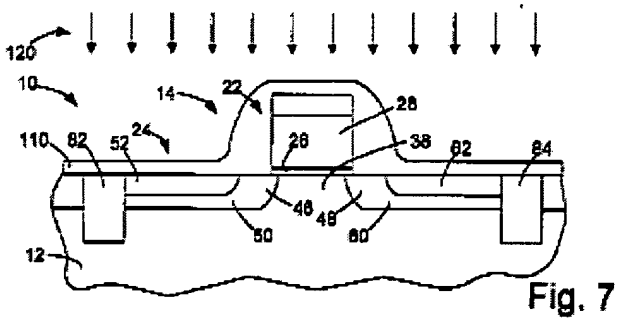


Fig. 7

forming a source/drain region **54,64**, the formation of the source/drain region resulting in forming a floating structure **52, 62** from the shallow region that is located in the LDD region **46, 48** and generally aligned with the side edge of the gate structure 28 (col. 5, lines 43-54 and FIG. 9).

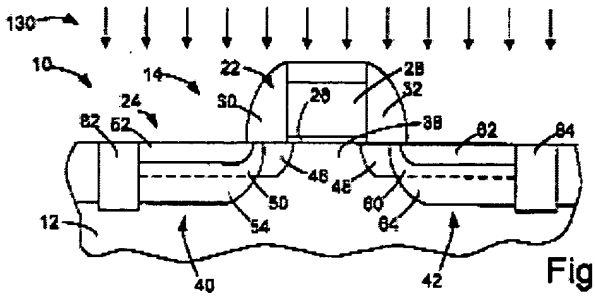


Fig. 9

Fisher discloses that the second dopant implant 120 and 130 is in the range 5 x 10^{12} to 1 x10^{16} atoms/cm^2 (col. 5, lines 19-62) and the dopant concentration of the LDD region is between 1x 10^{12} to 1x10^{16} atoms/cm^2 (col. 4, lines 45-53). **Fisher** further stated that it will be appreciated that the energy and concentration of the implants may vary greatly depending on the type of material implanted and that other suitable values may be used instead. It will also be appreciated that different ranges may be used for different transistors on different parts of the same device. **Fisher** does not explicitly discloses that the floating structure having reduced dopant concentration relative to the dopant concentration of the LDD region as recited in the currently amended independent claim 1.

However, there is no evidence indicating that the dopant concentration ranges of the floating structure having reduced dopant concentration relative to the dopant concentration of the LDD region is critical and it has been held that it is not inventive to discover the optimum or workable dopant concentration ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP § 2144.05.

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

In re claim 14, **Fisher** discloses that the LDD region **46, 48** being formed with a dose (1x10^{12}-1x10^{16} atoms/cm^2) of a dopant that is greater than a dose of a dopant utilized

to form the shallow region (10^{12}-10^{15} atoms/cm^2) (col. 4, line 45 to col. 5, line 34 and FIGS. 4 and 7).

In re claim 15, **Fisher** discloses that the dose of the dopant **100** that is utilized to form the shallow region is at least approximately twenty-percent less than the dose of the dopant **120** that is utilized to form the LDD region **120** (col. 4, line 45 to col. 5, line 34 and FIGS. 4 and 7).

In re claim 16, **Fisher** discloses the formation of the LDD region **46, 48** further comprising implanting a dose **120** of n-type dopant in a range from about ($1x10^{12}$-$1x10^{16}$ atoms/cm^2), and the formation of the shallow region further comprising implanting a dose 100 in a range (10^{12}- 10^{15} atoms/cm^2) (col. 4, line 45 to col. 5, line 34 and FIGS. 4 and 7).

In re claim 17, it is well-known to one of ordinary skill in the art at the time of the invention was made that the at least one of the implantation of the formation of the LDD region and the formation of the shallow region further comprising employing tilted angle implants to increase an amount of overlap beneath the gate structure.

In re claim 18, **Fisher** discloses that the formation of the source/drain region **54, 64** being implemented with a dose of a dopant ($5x10^{14}$-$1x10^{16}$ atoms/cm^2) that is greater than a dose of a dopant utilized to form each of the LDD region **120** ($1x10^{12}$-$1x10^{16}$ atoms/cm^2) and the shallow region (col. 5, lines 19-54).

In re claim 19, **Fisher** discloses that the CMOS structure is an n-channel CMOS structure, the shallow region comprising a p-type dopant (col. 4, line 45 to col. 5, line 54).

In re claim 20, **Fisher** discloses that the shallow region comprising boron (B), the floating structure **52, 62** comprising a boron floating ring **52, 62** substantially aligned with the side edge of the gate structure **28** (col. 4, lines 45-53 and FIGS. 4 and 9).

In re claim 21, **Fisher** discloses that the CMOS structure is a p-channel CMOS structure, the shallow region comprising an n-type dopant (col. 4, line 45 to col. 5, line 54).

In re claim 22, **Fisher** discloses a transistor structure formed according to the method of claim 13 (FIG. 9).

Response to Applicant's Amendment and Arguments

Applicants contend that no such step "with reduced dopant concentration relative to the dopant concentration of the LDD region" is taught or suggested by Fisher (U.S. Patent 6,391,733) herein known as Fisher, either alone or in the combination as claimed.

In response to Applicants' contention that no such step "with reduced dopant concentration relative to the dopant concentration of the LDD region" is taught or suggested by Fisher. Examiner respectfully submits Applicants' argument is moot in view of the new grounds of rejection presented in this Office Action.

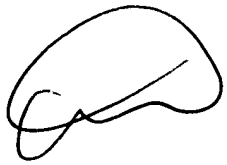
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D. Nguyen whose telephone number is (571) 272-1865. The examiner can normally be reached on Monday-Friday (8:30 AM - 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

K.N.
December 2, 2005



W. DAVID COLEMAN
PRIMARY EXAMINER